SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, April 16.—"An Attempt to determine the Adiabatic Relations of Ethyl Oxide. Part I. Gaseous Ether." By Prof. W. Ramsay, F.R.S., and E. P. Perman, B.Sc.

The object of the research described in the memoir is the determination of the behaviour of ether in the state of gas approaching towards the state of liquid, when heat is communicated to it, so as to alter its condition adiabatically.

Previous researches by one of the authors in conjunction with Dr. Sydney Young have yielded data regarding the relations of pressure, temperature, and volume of gaseous and of liquid ether from which the values of the isobaric and of the isochoric differentials are obtainable. Such results lead directly to a knowledge of the differences between the specific heats at constant pressure and those at constant volume; and these differences are not constant, but vary with varying volume, pressure, and temperature.

The memoir contains an account of experiments made to determine the ratio between the specific heats at constant pressure and those at constant volume. The velocity of sound in gaseous ether was determined at various temperatures, pressures, and volumes; and by means of the isothermal differentials, and the experimental results for the velocity of sound, the ratios between the two specific heats were calculated. From the differences and the ratios of the specific heats, the values of the specific heats were deduced.

The general conclusion is that, for any constant volume, the specific heat, whether at constant volume or at constant pressure, decreases to a limiting value with rise of temperature, and subsequently increases; and that the change with temperature is more rapid, the smaller the volume.

At large volumes, the specific heats tend towards independence of temperature and volume, while at small volumes the influence of change of temperature and volume is very great.

The authors are at present investigating similar relations for liquid ether.

Zoological Society, April 21.—Prof. W. H. Flower, C.B., F.R.S., President, in the chair.—A communication was read from Lieut-Colonel Sir Oliver B. C. St. John, R.E., containing notes on a case of a Mungoose (*Herpestes mungo*) breeding during domestication.—Mr. R. E. Holding exhibited and made some remarks on some remarkable horns of Rams of the domestic Sheep of Highland and other breeds.—Messrs. Beddard and Murie exhibited and made remarks on a cancerous nodule taken from the stomach of an African Rhinoceros (*Rhinoceros bicornis*), which had recently died, after living 22 years in the Society's Gardens.—Mr. E. T. Newton read a paper on the structure and affinities of *Trogontherium cuvieri*, basing his remarks principally on a fine skull of this extinct Rodent lately obtained by Mr. A. Savin from the forest-beds of East Runton, near Cromer.—Mr. H. J. Elwes read the first part of a memoir on the Butterflies collected by Mr. W. Doherty in the Naga Hills, Assam, the Karen Hills in Lower Burmah, and in the State of Perak.—Mr. J. J. Lister gave an account of the birds of the Phœnix Islands, Pacific Ocean, as collected and observed during a visit to this group made in H.M.S. *Egeria* in 1889.

May 1.—Sixty-second Anniversary Meeting.—Prof. Flower, F.R.S., President, in the chair.—After the auditors' report had been read, and other preliminary business had been transacted, the report of the Council on the proceedings of the Society during the year 1890 was read by Mr. Sclater, F.R.S., the Secretary. It stated that the number of Fellows on January 1, 1891, was 3046, and that the number of Fellows elected or readmitted in 1890 was 121, being 4 less than the corresponding number in 1889. Since the last anniversary 2 Foreign Members and 11 Corresponding Members had been elected to fill vacancies in those lists. In recognition of the effective protection accorded for sixty years to the Great Skua (*Stercorarius catarrhactes*) at two of its three British breeding stations—namely, in the Island of Unst by the late Dr. Laurence Edmondston and other members of the same family, and in the Island of Foula by the late Dr. Scott, of Melby, and his son, Mr. Robert T. C. Scott—the silver medal of the Society had been awarded to Mrs. Edmondston, of Buness House, as representative of that family, and to Mr. Robert T. C. Scott, of Melby. The total receipts of the Society for 1890 had amounted to £25,059, which, although not quite equal to those of 1889, had exceeded those of 1888 by upwards of £1000, and might be deemed to be satisfactory. The ordinary expenditure for 1890 had been £23,342 6*s.* 11*d.*, which was £659 2*s.* 8*d.* more than the corresponding amount for 1889. Besides this an extraordinary expenditure of £230 4*s.* 6*d.* had been devoted to the material improvement of the Monkey House, which brought up the total expenditure of the year to £23,572 11*s.* 5*d.* The balance brought forward from 1889 was £1242 13*s.* 11*d.*, and this, added to the income received in 1890, gave a total sum of £26,302 11*s.* 9*d.* available for the expenditure of the year 1890. By these means the Council had been enabled, after payment of the ordinary and extraordinary expenditures of the year, not only to devote the usual sum of £1000 to the reduction of the mortgage-debt on the Society's freehold premises (which at present amounted to £5000 only), but also to purchase a sum of £1000 in Consols, in order to form the nucleus of a new reserve fund. The usual scientific meetings had been held during the session of 1890, and a large number of valuable communications had been received upon every branch of zoology. These had been published in the annual volume of Proceedings for 1890, which contained 730 pages, illustrated by 57 plates. Besides this, part x., being the concluding part of the twelfth volume, of the Society's quarto Transactions had been issued. The twenty-sixth volume of the *Zoological Record*, containing a summary of the work done by British and foreign zoologists during the year 1889, had been issued to the subscribers in December last, and had thus been published before the close of the year after that to which it relates. The library had been kept in good working order during the past year, and had been much frequented by working zoologists. A large number of accessions, both by gift and purchase, had been received and incorporated. In the Gardens the only new work carried out in 1890 had been the completion of the improvements of the Monkey House, but a large number of repairs and renewals of the different buildings in the Gardens had been made, and other minor improvements had been carried out. The number of visitors to the Gardens during the year 1890 had been 640,987, the corresponding number in 1889 having been 644,579. The number of school children admitted free in 1890 was 35,935. The number of animals in the Society's collection on December 31 last was 2256, of which 693 were mammals, 1273 birds, and 290 reptiles. Amongst the additions made during the past year, twelve were specially commented upon as of remarkable interest, and in most cases representing species new to the Society's collection. About 28 species of mammals and 20 of birds had bred in the Society's Gardens during the summer of 1890. The report concluded with a long list of the donors and their various donations to the Menagerie during the past year.—A vote of thanks to the Council for their report was moved by Mr. W. H. Hudleston, F.R.S., seconded by Mr. A. J. Scott, and carried unanimously.—The report having been adopted, the meeting proceeded to elect the new Members of Council and the officers for the ensuing year. The usual ballot having been taken, it was announced that Mr. William T. Blanford, F.R.S., Dr. Albert Günther, F.R.S., Mr. E. W. N. Holdsworth, Sir Albert K. Rollit, M.P., and Mr. Howard Saunders, had been elected into the Council in the place of the retiring members, and that Prof. Flower, C.B., F.R.S., had been re-elected President, Mr. Charles Drummond, Treasurer, and Dr. Philip Lutley Sclater, F.R.S., Secretary to the Society for the ensuing year.—The remaining business having been concluded, the President handed the silver medal of the Society to Mr. Thomas Edmondston, who attended on the part of Mrs. Ursula Edmondston, of Buness, Unst, Shetland, and to Mr. A. P. Purves, who attended on behalf of Mr. Robert T. C. Scott, of Melby, Shetland, in recognition of the effective protection accorded by them and their families respectively to the Great Skua at its breeding places in the Shetland Islands.—The proceedings terminated with the usual vote of thanks to the President.

Geological Society, April 22.—Dr. A. Geikie, F.R.S., President, in the chair.—The following communications were read:—Results of an examination of the crystalline rocks of the Lizard district, by Prof. T. G. Bonney, F.R.S., and Major-General C. A. McMahon. The authors, in company with the Rev. E. Hill, spent a considerable part of last August in examining anew those sections in the Lizard district which had any bearing upon the questions raised since the publication of Prof. Bonney's second paper in 1883. They had also the advantage of occasional conference with Mr. Teall and Mr. Fox, whose valuable contributions to the knowledge of the crystalline rocks of this district are well known. That the Lizard serpentines are altered peridotites may be regarded as settled, but doubts have been expressed as to their relation to other associated rocks, and as to the meaning of a streaky or banded structure exhibited by certain varieties. The authors, after re-examination of a large number of sections, feel no doubt of the accuracy of their original view that the peridotite was intruded into the hornblende schists and banded "granulitic" rocks, after these had assumed their present condition. In it they find no signs of any marked pressure-metamorphism, either prior or posterior to serpentinization. They have failed to connect the streaky or banded structure with any foliation or possible pressure-structure in the schists, and they can only explain it as a kind of fluxion-structure, viz. as due to an imperfect blending of two magmas of slightly different chemical composition, anterior to the crystallization of the mass. The Porthalla sections have been examined with especial care, not only because the serpentine is nowhere so conspicuously banded, but also because its intrusive character has been denied, both it and the hornblende schists being ascribed to the alteration of a series of sedimentary rocks of suitable composition. For this view the authors have failed to discover any evidence, and consider it contrary to stratigraphical and petrographical facts. In regard to the genesis of the crystalline schists, which for purposes of reference were divided by Prof. Bonney into a "granulitic," a "hornblendic," and a "micaceous" group, the authors show that in parts of the first the more acid rock breaks through the more basic, as if intrusive, in others they appear to be perfectly interstratified, the one passing backwards and forwards, though rapidly, into the other. But between these extremes, intervals can be found where the two rocks seem as if partially drawn out together. The authors are agreed that certainly one, probably both, of these rocks are igneous, that when the basic rock was solid enough to be ruptured, the acid magma broke into it, and sometimes softened it sufficiently to allow of the two flowing for some little distance together, after which crystallization took place. In regard to the hornblende schists, the authors are not yet satisfied that either fluxion or mechanical crushing will account for every structure which they have examined, and prefer to leave the question, in certain cases, an open one. The most distinctive features of the micaceous group appear due to subsequent earth-movements, so that, though it exhibits some special characteristics, the authors are doubtful whether it is any longer worth while separating it from the hornblende schists. Of the igneous rocks newer than the serpentine, the gabbro has received the closest attention. It exhibits in places (especially in the great dyke-like mass at Carrick Luz) a very remarkable foliation or even mineral banding, which has been claimed as a result of dynamo-metamorphism. The authors bring forward a number of instances to establish the following conclusions :—(*a*) That this foliation occurs most markedly where the adjacent serpentine does not show the slightest sign of mechanical disturbance; (*b*) that it must be a structure anterior to the consolidation of the rock; (*c*) that it sets in and out in a very irregular manner; (*d*) that when it was produced the rock was probably not a perfect fluid. Hence they explain it also as a kind of fluxion structure, produced by differential movements in a mass which consisted of crystals of felspar and pyroxene, floating thickly in a more or less viscous magma. The authors' investigations tend to prove that (*a*) structures curiously simulative of stratification may be produced in fairly coarsely crystalline rocks by fluxioned movements anterior to crystallization; and that (*b*) structures which of late years have been claimed as the result of dynamo-metamorphism subsequent to consolidation must have, in many cases, a like explanation. This is probably the true explanation of a large number of banded gneisses which show no signs of crushing and holocrystalline, but in their more minute structures differ from normal igneous rocks. The authors have seen nothing which has been favourable to the idea that pressure has raised the temperature of solid rocks sufficiently to soften them. A discussion followed, in which Mr. Teall, the Rev. E. Hill, Prof. Hull, the President, General McMahon, and Prof. Bonney took part.—On a spherulitic and perlitic obsidian from Pilas, Jalisco, Mexico, by Frank Rutley.

Royal Microscopical Society, April 15.—Dr. R. Braithwaite, President, in the chair.—Mr. T. Charters White presented three slides of sections of teeth permeated with collodion.—A letter from Mr. J. Aitkin, of Falkirk, was read, on a spot-mirror method of illumination.—An abstract was read of a paper, by Surgeon V. Gunson Thorpe, R.N., on some new and foreign Rotifera found on the West Coast of Africa, and belonging to the genera *Trochosphæra* and *Floscularia*.—Mr. E. M. Nelson exhibited two forms of bull's-eye condenser—one made like Herschel's asplanatic, the other a new and simpler form, being made of two plano-convex lenses. This condenser seemed to answer its purpose admirably, the amount of spherical aberration being only about one-fifth of that which existed in the old form.—Mr. Nelson also read some further notes on Diatom structures as test-objects, which he illustrated by photographs.—Mr. C. Haughton Gill's additional note on the treatment of Diatoms was read, the subject being illustrated by photo-micrographs. Mr. Mayall said the problem Mr. Gill had endeavoured to solve was as to the existence or not of cellular structure in Diatoms extending through their substance, and he sought to demonstrate this by making chemical depositions which would probably fill up the cavities sufficiently to be distinguished by the microscope. Mr. Gill's observations were of great interest, because he had experimented with the definite purpose of testing a special point, thus applying to microscopy what Herschel would have termed an "experiment of inquiry"—a direct questioning of Nature on a point that had hitherto been regarded as almost beyond the sphere of experiment.

PARIS.

Academy of Sciences, April 27.—M. Duchartre in the chair.—The Secretary read an extract from the will of the late M. Cahours, and M. Janssen made some remarks upon the legacies left for the foundation of scholarships (see p. 17).—On the expressions of the pressures in an elastic homogeneous body, by M. H. Resal.—On the theory of elasticity, by M. H. Poincaré.—Researches upon humic substances, by MM. Berthelot and G. André. According to the observations of the authors, the humic substance formed by the action of hydrochloric acid upon cane sugar possesses etheric and anhydric properties, and is comparable in certain respects to the lactones.—On the origin of pus cells and on the *rôle* of these elements in inflamed tissues, by M. L. Ranvier.—On the performance of marine engines and that of screws, and on a geometrical method for calculating the first of these values without a dynamometer, by M. A. Ledieu.—Mica as an invariable dielectric, by M. E. Bouty. The author has previously shown that the capacities of mica condensers vary slightly with the duration of charging. He now finds that mica behaves as an invariable dielectric in a direction normal to the planes of cleavage—that is, the capacity (c) of a lamina of useful surface (ρ) and thickness (e) is represented by the formula $c = \frac{k\rho}{4\pi e}$, where k is a constant. It is remarked that the origin of the large variations of such condensers with duration of charging is the electrolysis of foreign substances contained in the superficial layers.—On an alternate current motor, by MM. Maurice Hutin and Maurice Leblanc.—Quantitative studies on the chemical action of light: first part—measure of physical absorption, by M. G. Lemoine. The action of light upon a mixture of oxalic acid and ferric chloride of various thicknesses and strengths is theoretically and experimentally determined.—Effect of the presence of halides of potassium upon the solubility of the neutral sulphate of potassium, by M. Ch. Blarez. Between 0° and 30° the solubility of K_2SO_4 in water is given in parts per 100 by

$$Q\theta = 8{\cdot}5 + 0{\cdot}12\theta.$$

On adding KCl, or other halide of potassium, at any definite temperature, the K_2SO_4 remaining in solution is given by the expression—

K_2SO_4 dissolved = a constant − the amount of K in added salt; for any temperature this becomes

$$K_2SO_4 \text{ dissolved at } \theta^\circ = 7{\cdot}5 + 0{\cdot}14170 - \text{K of added salt.}$$

The precipitating action of the halides of potassium upon the saturated solution of the neutral sulphate of potassium is *proportional to the equivalent of the added salt*.—On iso-cinchonine, by MM. E. Jungfleisch and E. Léger.—On a hydrocarbon of the terpene series contained in the oils of compressed gas, by MM. A. Étard and P. Lambert. This is a pyropentylene not identical with valylene or pirylene; it polymerizes readily to $C_{10}H_{12}$. Its properties and relations with the terpenes will be given in a subsequent paper.—Researches upon trehalose, by M. Maquenne. Anhydrous trehalose is an octatomic alcohol isomeric with the saccharoses, and very near to maltose in chemical constitution; it yields glucose on inversion, and does not fulfil aldehydic functions.—On the constitution of aqueous solutions of tartaric acid, by M. Aignan. The author arrives at the conclusion that tartaric acid exists in aqueous solution in the state expressed by the formula $(C_4H_6O_6)_2$, partially dissociated according to a definite law.—Researches upon the artificial production of hyalite at the ordinary temperature, by M. Stanislaus Meunier.—On the stomachic digestion of the frog, by M. Ch. Contejean. Experimental evidence is given (1) that the pepsin secreted by the œsophagus is more abundant or more active than that of the stomach; (2) that the œsophagean and stomachic pepsins transform coagulated albumin into syntonin, and afterwards into peptone, without passing through the pro-pepsin stage; (3) that the predominance of the action of œsophagean pepsin on stomachic pepsin is especially manifest by the larger quantity of syntonin that it produces.—On the sexual evolution of the trouts of the Pyrenees, by M. A. Cannieu. The metamere of the endodermous layer and of the primitive circulatory system in the post-branchial region of Vertebrata, by M. F. Houssay.—Contribution to the study of the mechanism of urinary secretion, by M. O. van der Stricht.—Reappearance during winter of the starch in ligneous plants, by M. Émile Mer. The researches indicate that in ligneous plants starch is reabsorbed at the end of the autumn, and generated at the beginning of spring. It results from this that the winter, instead of being the season during which the amylaceous reserve is most considerable, is the season during which it is least.—On some points in the anatomy of the vegetative organs of Ophioglossa, by M. G. Poirault. The observations show that the Ophioglossum fungus is never reproduced by spores, but is propagated exclusively by buds on the roots.—On the existence of Diatoms in the lower lands of North France and Belgium, by M. L. Cayeux.—On the proportion of water in corn from different localities, by M. Balland.—On the treatment of phylloxerous vines by carbon bisulphide mixed with vaselines, by M. P. Cazeneuve.

BRUSSELS.

Academy of Sciences, February 7.—M. F. Plateau in the chair.—Micrographical researches on the nature and origin of phosphate rocks, by M. A. F. Renard. The author gives the preliminary results of some researches on the formation of phosphate rocks. The investigation has been especially directed towards the problem of the origin of these rocks, and some important conclusions are arrived at with regard to this point. A lithographic plate, containing magnified representations of nineteen phosphate chalk specimens, accompanies the paper.—The winter of 1890-91, by M. F. Folie. It is remarked that observations at Brussels show that the winter of 1890-91 is one of the severest passed during the last sixty years. Since 1833 seven winters have been of a severity comparable with the last. They are 1837-38, 1840-41, 1844-45, 1846-47, 1854-55, 1870-71, 1879-80. A table is given showing the mean minimum temperature and the mean temperatures experienced during these years. This comparison and a consideration of summer temperatures do not point to any particularly definite facts. The idea that a hot summer succeeds a rigorous winter does not appear to be supported. On the contrary, it appears that the coming summer should be more cold than hot, with the exception of the months of May and August.—On variations in the latitude of a single place, by M. F. Folie. The reality of the variations in latitude deduced from observations made at Berlin, Potsdam, and Prague, are contested on the ground of systematic errors in the formulæ of reduction, due to the assumption that the earth has been considered to move as a solid body, whereas M. Folie believes it to be composed of a fluid nucleus with a solid crust.—Researches on the development of Arachnætis: contribution to the morphology of Cerianthidæ, by M. E. van Beneden.—Researches on the velocity of evaporation of liquids at temperatures below their boiling-points, by M. P. de Heen. The first part of this paper was read at the January meeting. The results are now given of experiments on the variations of the velocity of evaporation with the hygrometric condition of the current employed. The whole of the observations show that the velocity of evaporation, v, of a liquid surface acted on by wind may be expressed by the formula—

$$v = AF(100 - 0{\cdot}88f)\sqrt{V}$$

where A is a constant, F the tension of the saturated vapour at the temperature of the liquid, and V the velocity of the current.—Determination of the radius of curvature in parallel co-ordinates, by M. Maurice d'Ocagne.

March 7.—M. Plateau in the chair.—On a curious peculiarity of currents of water, and on one of the causes of sudden floods, by M. G. van der Mensbrugghe. An explanation is given of the fact that in a river the maximum velocity of the current does not occur at the surface, but about three-tenths of the depth below the surface.—Reduction of nitrates by sunlight (second note), by M. Émile Laurent. The author has caused a beam of sunlight to fall upon solutions of nitrates placed in a vacuum, and has found that after a certain time the space contained liberated oxygen, whilst the liquids possessed the characteristic reactions of nitrites. M. Laurent has analyzed the oxygen and nitrites, and finds that the quantity of gas is sensibly proportional to the nitrite formed. As might have been expected, the blue end of the spectrum possesses the most powerful reducing action.—Note on the coagulation of the albumins of the serum of cow's blood, by MM. J. Corin and G. Ansiaux. The authors support the assertion made by Halliburton in 1883, that the albumin of serum ought not to be considered as a single substance, but as a mixture of two or three albuminoids, α, β, and γ, coagulating respectively at temperatures—$\alpha = 73°$ C., $\beta = 77°$ C., and $\gamma = 82°$ C. The blood of man, the dog, pig, rabbit, &c., were known to contain these three substances, and it is now shown that the serum of the cow also contains the paraglobulin α, and the albumins β and γ. Further, it is shown that opalescence and coagulation are not distinct things, but two forms of one and the same phenomenon occurring at the same temperature.—On the curvature of polars with respect to a point on a curve of the nth order, by Prof. C. Servais.—Discovery of a variable star, by M. L. de Ball. An account is given of observations of a variable red star situated in R.A. 20h. 41m. 19s., Decl. + 2° 2′·3 (1891). The observations extend from September 15, 1890, to January 9, 1891. In this time the magnitude of the star increased from 8·7 to 8. The star is not included in Bermingham's Red Star Catalogue. M. de Ball's observations are only eye-estimations, and have not been made by the aid of a photometer. Further evidence of variability is therefore required.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Lessons in Astronomy: C. A. Young (Arnold).—Practical Perspective: J. Spencer (Percival).—Revision or Examination Sheets; Subject II., Machine Construction and Drawing, Elementary Stage: A. G. Day (Percival).—General Physiology: Dr. C. Calleja (Kegan Paul).—Differential and Integral Calculus: A. G. Greenhill, 2nd edition (Macmillan and Co.).—Natural Selection and Tropical Nature: A. R. Wallace; new edition (Macmillan and Co.).—Fifth Report of the U.S. Entomological Commission: A. S. Packard (Washington).—Principles of Political Economy and Taxation: D. Ricardo; edited by E. C. K. Gonner (Bell).—L'Évolution des Formes Animales: F. Priem (Paris, Baillière).—Géologie, Principes—Explication de l'Époque Quaternaire sans Hypothésis: H. Hermite (Neuchâtel, Attinger).

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